

Comparing Patient Outcomes After THA and TKA

Is There a Difference?

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Abstract Both primary total hip (THA) and knee (TKA) arthroplasty relieve pain, restore function, and increase mobility. Despite these successes, there is controversy as to whether THA or TKA provides greater or similar improvement. We therefore compared primary THA and TKA patient results in terms of (1) willingness to have surgery again; (2) WOMAC change score; (3) whether expectations were met; and (4) satisfaction. Patients undergoing primary THA were more willing to undergo their surgery again (THA 96%, TKA 89%), demonstrated greater WOMAC change scores, more frequently reported their expectations were met (THA 78%, TKA 70%), and expressed greater overall satisfaction (THA 89%, TKA 81%). In addition, patients undergoing THA expressed higher satisfaction with pain reduction while performing activities (ie, walking, stairs, and sitting/lying) and their ability to perform daily activities (ie, stairs, transportation, getting up, lying in bed, and light domestic duties) when compared with patients undergoing TKA. Our data suggest primary THA offers superior short-term outcomes when compared with primary TKA.

Level of Evidence: Level II, prognostic study. See Guidelines for Authors for a complete description of levels of evidence.

Introduction

THA and TKA have revolutionized the care of patients with end-stage arthritis of these joints. Both procedures relieve pain, restore function, and ensure mobility as measured by validated health-related outcome tools [2, 6, 8, 11, 16, 20].

Despite the success of both THA and TKA, few studies have compared the outcomes of patients undergoing THA and those undergoing TKA. In a meta-analysis of THA and TKA outcome studies, Ethgen et al. concluded THA returned patients to a higher functional level [11]. Conversely, Jones et al. reported little difference between patients undergoing THA and those undergoing TKA preoperatively or at 6 months followup [15]. Mahomed et al. noted no difference in SF-36 and WOMAC scores between primary THA and TKA, but noted patient expectations were important predictors of improved functional outcomes (SF-36, WOMAC) and satisfaction [18]. Thus, there is controversy in the literature as to whether THA and TKA provide greater or similar improvement in function compared with the other.

We therefore compared patients with primary THA and primary TKA to answer the following questions: (1) did the two groups differ with regard to willingness to have surgery again; (2) did the WOMAC change scores (postoperative minus preoperative scores) differ; (3) were there differences with regard to expectations met; and (4) did their satisfaction differ? Our hypothesis was that primary THA and TKA patient outcomes in terms of these parameters would be similar.

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Each author certifies that his or her institution has approved the reporting of these cases, that all investigations were conducted in conformity with ethical principles of research, and that informed consent for participating in the study was obtained.

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Patients and Methods

We used data from the Ontario Joint Replacement Registry (OJRR), a subset of the Canadian Joint Replacement Registry [7]. The data in this report were collected from patients undergoing primary THA and TKA in a large inception cohort that evaluated the relationship among severity at decision for surgery, waiting time for surgery, and 1-year outcomes [13]. One-year postoperative surveys were sent to 4437 patients who had completed a decision date for surgery WOMAC score with 3050 (69%) patients returning complete questionnaires after two mailings. Patients with all diagnoses were deemed eligible to be included provided they had a WOMAC score [3–5] collected at the decision date for surgery and responded to a questionnaire sent out 1 year postoperatively assessing their satisfaction, expectations, willingness to undergo surgery again, 1-year WOMAC score, and self-reported complications [3–5, 8, 12, 16, 17]. We excluded patients with revision arthroplasties, those “on sick leave” or disability, and those who had a second joint arthroplasty during the study period [8].

We observed differences in patient age at the time of surgery (THA 68 ± 11 years, TKA 70 ± 9 years), diagnosis (osteoarthritis: THA 87%, TKA 92%), body mass index (THA 29 ± 6 , TKA 31 ± 6), and whether the patient was working at the time of their surgery (THA 29%, TKA 21%), but given the large nonrandomized sample size, some of these differences might not be meaningful [10, 19] (Table 1). We observed no difference in the patient populations in terms of gender, American Society of Anesthesiologists scores (3 and 4 versus 1 and 2) as a measure of comorbidities, or whether the patient lived alone. The questions that this study was designed to answer were: (1) are patients undergoing primary THA and TKA similar in terms of their willingness to have surgery again? (2) Are there differences in the WOMAC change scores (postoperative minus preoperative scores) for patients undergoing primary THA and TKA? (3) Are there

differences between patients undergoing primary THA and those undergoing TKA in terms of whether their expectations were met? (4) Are there differences in patient satisfaction after primary THA or TKA? Our hypothesis was that patients undergoing primary THA and TKA would be equally willing to undergo surgery again, similar in terms of WOMAC change scores, similar in terms of expectations met, and equally satisfied.

Data were collected by surgeons and their staff who participated in the OJRR [7]. Preoperatively and at the decision date for surgery, the following demographic and clinical data were collected: age, gender, side, primary diagnosis, reassessment versus new referral, deformity (flexion contracture, varus, valgus), knee flexion, body mass index, American Society of Anesthesiologists Physical Status Score [1], employment status (working full-time, working part-time, homemaker, retired, unemployed looking for work, not working for another reason), living status (live alone: yes/no), and independence with activities of daily living.

One year after their THA or TKA, we mailed questionnaires to patients. We used Dillman procedures to maximize the response rate [8]. The Dillman procedure uses a structured approach to contacting study participants by regular mail to maximize response rates. First, a pre-notice letter is sent followed by the questionnaire and then a reminder postcard. After this, nonrespondents receive two additional separate mailings of the questionnaire with the final contact made by special delivery. The packets included the WOMAC questionnaire (1-year WOMAC) [3–5], a question about willingness to undergo surgery again (yes, no, uncertain) [9], self-reported postoperative complications (requiring admission to a hospital overnight because of your TKA: yes/no; reason), looking back had their expectations had been met (met, not met, had none), and a satisfaction questionnaire.

The WOMAC included 24 items covering three domains: pain, stiffness, and physical function [3–5]. The

Table 1. Demographic distributions of the primary total hip and knee arthroplasty populations

Joint demographics	Hip	Knee	Significance
Age (mean), 95% CI (upper, lower)	68.13 (67.54, 68.72)	69.73 (69.31, 70.15)	< 0.0001
Body mass index (mean), 95% CI (upper, lower)	28.69 (28.40, 28.99)	31.46 (31.17, 37.75)	< 0.0001
Female (%)	58%	61%	0.063
Osteoarthritis (%)	87%	92%	< 0.0001*
Working (%)	29%	21%	0.003
Live alone (%)	21%	20%	0.472
ASA 3/4 (%)	39%	39%	0.851

* Although significant, the relationship is very weak with a Cramer's v value of 0.071; significance was found at the level 0.05; 95% CI = 95% confidence interval; ASA = American Society of Anesthesiologists.

scoring captured the level of pain, stiffness, and physical function with five response categories (numeric value): none (0), mild (1), moderate (2), severe (3), and extreme (4); thus, lower values in the traditional scoring method reflected a better state. In orthopaedics, it has been common to reverse the scoring and normalize to a 0 to 100 scale such that high values reflect a better state. Using this reversed scale, WOMAC scores were summed for domain-specific and total scores (0–100, worst to best).

The satisfaction questionnaire included three questions: (1) overall, how satisfied are you with the results of your hip/knee arthroplasty; (2) how satisfied are you with your most recent hip/knee arthroplasty for reducing your pain (walking on a flat surface, going up or down stairs, sitting or lying); and (3) how satisfied are you with your most recent hip/knee arthroplasty for improving your ability to perform five functions (going up stairs, getting in or out of a car or on or off a bus, rising from bed, lying in bed, performing light domestic duties) [17]? We asked patients to grade their level of satisfaction for each question, ie, very dissatisfied, dissatisfied, neutral, satisfied, or very satisfied. The overall satisfaction question was used to determine a two-category satisfaction outcome by combining patients who answered very dissatisfied, dissatisfied, or neutral into one group and

patients who answered satisfied or very satisfied into the second group. The two-category outcome (satisfied, not satisfied/neutral) was used as the measure of overall satisfaction for all univariate and multivariate statistical analyses.

We determined the WOMAC change score by subtracting the decision date WOMAC from the 1-year WOMAC. Missing WOMAC items were imputed as suggested by Bellamy and colleagues [3–5]. We excluded 257 (6%) of the 4437 patient questionnaires with more than one pain or three function missing items.

To compare patients undergoing THA and those undergoing TKA for the four questions posed, we used crosstabulation with chi square analyses for willingness to have surgery again, expectations met, and satisfaction. Differences in the WOMAC change scores were assessed with the Student's t-test. All statistical analyses were performed with SPSS Version 17 (SPSS Inc, Chicago, IL).

Results

A higher percentage ($p < 0.0001$) of patients undergoing primary THA indicated they would have their surgery again as compared with those with TKA (96% versus 89%, respectively) (Table 2).

WOMAC change scores (postoperative minus preoperative scores) were better for patients undergoing primary THA as compared with patients undergoing primary TKA in terms of pain relief, joint stiffness, and function (Table 3).

A higher ($p < 0.0001$) percentage of patients undergoing THA indicated their expectations were met compared with those undergoing TKA (78% versus 70%, respectively).

Table 2. Comparison of patients undergoing primary THA and those undergoing TKA with regard to willingness to have surgery again

Surgery again*	Hip	Knee
Yes	96% (1280)	89% (1525)
Uncertain	3% (42)	7% (114)
No	1% (16)	4% (73)

* Willingness to have surgery again was significant between joint groups ($p < 0.0001$).

Table 3. Comparison of patients undergoing primary THA and TKA with regard to willingness to have surgery again

WOMAC outcome		Hip	Knee	Significance*
Preoperative	Pain	41.61 ± 17.06	43.38 ± 16.82	0.004
	Joint stiffness	38.72 ± 19.67	40.16 ± 20.31	0.047
	Function	37.94 ± 16.55	42.36 ± 16.24	< 0.0001
	Total	38.77 ± 15.80	42.39 ± 15.04	< 0.0001
1 year	Pain	91.11 ± 13.85	86.24 ± 16.31	< 0.0001
	Joint stiffness	87.24 ± 16.27	79.42 ± 19.70	< 0.0001
	Function	86.04 ± 15.47	80.88 ± 17.62	< 0.0001
	Total	87.20 ± 14.34	81.88 ± 16.64	< 0.0001
Change	Pain	49.70 ± 19.62	42.04 ± 20.62	< 0.0001
	Joint stiffness	47.90 ± 23.88	38.08 ± 25.01	< 0.0001
	Function	47.79 ± 20.26	37.98 ± 20.85	< 0.0001
	Total	48.17 ± 19.05	38.84 ± 19.74	< 0.0001

* Significance was found at the level of 0.05; all WOMAC domains scores were significant between joint arthroplasty groups.

Table 4. Overall satisfaction while performing activities of daily living for patients undergoing primary THA and TKA*

Satisfaction survey questions and answers		Very dissatisfied		Dissatisfied		Neutral		Satisfied		Very satisfied	
		Hip	Knee	Hip	Knee	Hip	Knee	Hip	Knee	Hip	Knee
Overall		5.6%	7.6%	2.5%	4.0%	3.1%	7.7%	19.6%	29.3%	69.1%	51.3%
Pain	Walking on a flat surface	3.0%	4.0%	1.9%	3.3%	4.5%	7.2%	23.4%	33.2%	67.2%	52.3%
	Going up or down stairs	3.0%	4.8%	4.4%	8.5%	9.1%	15.0%	28.5%	36.9%	55.0%	34.7%
	Sitting or lying	2.4%	3.5%	1.5%	3.0%	5.0%	9.1%	26.2%	35.5%	64.8%	48.9%
Function	Ascending stairs	2.4%	4.4%	4.4%	7.8%	9.4%	15.0%	33.0%	39.2%	50.7%	33.6%
	Getting in or out of car or bus	2.2%	4.0%	4.4%	8.9%	9.4%	16.9%	35.7%	39.5%	48.3%	30.7%
	Rising from bed	2.2%	3.0%	1.5%	3.8%	6.6%	11.4%	30.9%	40.0%	58.8%	41.8%
	Lying in bed	2.2%	3.1%	1.4%	2.7%	5.5%	10.2%	26.8%	37.5%	64.0%	46.6%
	Performing light domestic duties	2.2%	2.7%	1.9%	3.8%	6.3%	10.7%	30.1%	38.6%	59.4%	44.2%

* Level of satisfaction was significantly different between joints (hip, knee) for all eight satisfaction questions ($p < 0.0001$).

Fifteen percent of patients indicated they had no expectations for their THAs and TKAs.

Patients undergoing primary THA (89%) reported greater satisfaction than patients undergoing primary TKA (81%). Patients undergoing primary THA expressed greater satisfaction ($p < 0.0001$) with their pain relief while performing activities and their ability to perform daily activities as compared with patients undergoing primary TKA (Table 4).

Discussion

Primary total hip (THA) and knee (TKA) arthroplasty relieve pain, restore function, and increase mobility. There is nonetheless controversy as to whether THA or TKA provides greater or similar improvement. We therefore compared patient outcomes after primary THA and TKA in terms of (1) willingness to have surgery again; (2) change in WOMAC score from decision date for surgery and 1 year postoperatively; (3) whether expectations were met; and (4) satisfaction. We found patients undergoing primary THA were more willing to have surgery again, have a greater WOMAC change score, have expectations that were met, and be more satisfied.

We acknowledge limitations to the study. First, only 1-year followup was included, although this is consistent with several other studies (Table 5) [5, 17, 18]. Second, although the WOMAC score has been validated for both hip and knee arthritis, certain function questions involve quadriceps function and vigorous use of the extensor mechanism, which might provide a negative bias for patients undergoing TKA [3–5]. Third, we excluded patients who had a second THA or TKA during the study period, believing the additional procedure with shorter followup might confuse patient responses as to which joint

was being assessed. We also excluded patients on sick leave or disability. We assume the effects on our data would be similar for THA and TKA. However, we included a large number of patients ($n = 3050$) reflecting those treated at community as well as academic hospitals and with devices that we believe represent the spectrum of contemporary implant designs.

Our findings are consistent with those in studies demonstrating large treatment effects in terms of pain reduction, greater function, and improved mobility after primary THA or TKA [2, 6, 8, 10, 11, 15–20]. Most of these studies dealt with only THA or TKA outcomes, but a few compared THA and TKA results. Fortin et al. [12] compared two cohorts of patients with osteoarthritis who had a primary THA or TKA. At 6 months followup, they also noted patients undergoing THA demonstrated greater improvement in their SF-36 physical function, WOMAC pain, and WOMAC function outcomes. Ethgen et al. [11] performed a meta-analysis of 32 studies assessing health-related quality of life in patients undergoing THA and TKA. At 6 to 12 months followup, they found both interventions were effective in improving health-related outcomes, but THA offered patients better return to function than TKA (Table 5). Finally, our study confirms

Table 5. Summary of published studies comparing primary THA and TKA patient outcomes at 6 to 12 months followup

Authors	Followup	THA versus TKA
Fortin et al. [12]	6 months	THA > TKA (WOMAC, SF-36)
Ethgen et al. [11]	6–12 months	THA > TKA (WOMAC, SF-36)
Current study	12 months	THA > TKA (willingness to have surgery again, WOMAC change scores, expectations met, satisfaction)

patients and doctors do not always agree on improvement in quality of life after an intervention [14].

Willingness to have surgery again is a good proxy for the patient's perception as to whether the intervention was beneficial. Chesworth et al. validated willingness to have surgery again with WOMAC change scores [8]. Most patients undergoing primary THA (96%) and TKA (89%) indicated they would have their operation again indicating the beneficial effects of both procedures but greater acceptance of THA.

The WOMAC change score is a measure of postoperative improvement from preoperative status [8]. Once again, patients undergoing primary THA demonstrated more improvement in their pain (50 versus 42 points out of 100), function (48 versus 38 points out of 100), stiffness (48 versus 38 points out of 100), and total score (48 versus 39 points out of 100) compared with patients undergoing primary TKA.

Expectations met or not correlate closely with patient satisfaction. Our data are consistent with the findings of Mahomed et al. [17]. In this study, more patients undergoing primary THA (78%) indicated their expectations were met than patients undergoing primary TKA (70%). The lower than anticipated expectations met for both groups indicate this is an important topic for future research.

Similarly, patients undergoing primary THA demonstrated a greater level of overall satisfaction (89% versus 81%), satisfaction with pain relief for activities of daily living such as stairclimbing (84% versus 72%), and function activities such as performing light domestic duties (90% versus 83%) compared with patients undergoing primary TKA (Table 4).

In conclusion, patients undergoing primary THA seem to have better clinical outcomes than patients undergoing primary TKA at 1-year followup. Although our study has demonstrated this difference, further study is required with regard to the patient, surgical, and implant-related factors that might be responsible for these differences.

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